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| ART UNIT | PAPER NUMBER |
|---|---|
| 1751 | |

DATE MAILED: 11/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/814,714 | BUSTA ET AL. | |
| | Examiner | Art Unit | |
| | Kallambella Vijayakumar | 1751 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *07 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1,3-9 and 12-36* is/are pending in the application.

4a) Of the above claim(s) *29-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 3-9, 12-28 and 36* is/are rejected.

7)☒ Claim(s) *3,16 and 22* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## DETAILED ACTION

- Claims 1, 3-9 and 12-36 currently pending with the application. Claims -1,3 and 18 amended. Claim-36 newly added. Claims 2, 10-11 cancelled. Claims 29-35 withdrawn from consideration due to earlier restriction requirement.
- Applicant's arguments with respect to claims have been fully considered but are moot in view of the new ground(s) of rejection. Applicant's amendment overcomes the rejection under 35 USC 112-II paragraph cited in the last office action. Applicant's argument that "Flowable Oxide" is a generic name of the chemical is not persuasive because it is a Trade Name of "hydrogen-silsesquioxane" developed by Dow-Corning and sold under the TradeMark FOx (flowable oxide) (See Biscotto et al). Applicant's attention is drawn to the erroneous claim numbers under Remarks (Pg-6) and New claim Number (Pg-9).

### *Claim Objections*

1. Claim 3 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The instant claim recites the limitation of " a photosensitive photoresist or a non-photosensitive photoresist" that is not further limiting the photoresist in claim-1.
2. Claim 16 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The instant claim recites the limitation of "diamond like carbon" that is not further limiting the limitation of "diamond" in claim-1.
3. Claim 22 objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The instant claim recites the limitation of "a non-photoresist" that is not further limiting the resins/media in claim-18.

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 3 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Claim-3 recites a limitation of a "non-photosensitive photoresist' that is not disclosed in the instant specification, while the disclosure teaches non-photosensitve resins (See Specification, Paragraphs 27, 31 and 39).

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claims 1, 3-8, 12-19 and 21-28 are rejected under 35 U.S.C. 102(b) as being anticipated by Tuck (WO 02/03413).

   The US 2004/0025732 is being used as the equivalent of WO 02/03413 in the present rejection.

Tuck et al teach a field emission device containing an array of field electron emitters formed by printing an ink containing: (i). Graphite, **carbon black, fumed silica;** (ii). A binder such as PVA/cellulose derivatives dispersed in a solvent or **methacrylate polymers** dissolved in solvents; and (iii). A dispersing agent comprising modified **polyurethane** in butyl acetate or modified **polyacrylate** in methoxypropanol (Para 0106, 0016-0024, 0039-0040; 0056-0070; 0078, 0089, 0163, 0164).

With regard to claims –3 and 21, the prior art teaches methacrylate polymers <photoresist> (See Angelo et al, US 4,376,057; Cl-2, Ln 7-10).

With regard to claim-4, the prior art teaches screen printing the ink over a conductive surface forming a field emitter (Para 0022).

With regard to claims 5-7, the prior art composition and its components are identical to that by the applicants, and the examiner asserts that the art composition will be identical to that made using the composition having specific properties and containing the components that are not an essential part of the composition as claimed.

With regard to claims 8, prior art composition is identical to that by the applicants, and identical compositions have identical properties.

With regard to claims 12-15, the prior art teaches a field emitter formed over a porous or planar surface (Para 0089, 0113), and the examiner asserts that the prior art composition and structure will be identical to that formed by the instant claimed process step in claim-14.

With regard to claim 17, the prior art teaches silica sol-gel or silica filler (Para 0056, 0040).

With regard to method claims 18-19 and 21-28, the prior art teaches making an ink by mixing the components that are identical to that claimed by the applicants, and coating the ink over a conductive substrate by spin coating, followed by drying/curing (Para 0145; 0283-0287) thus forming a field emitter over a conductive substrate that is either porous or planar surface. All the limitations of the instant claims are met.

The reference is anticipatory.

2. Claims 1, 4-8, 12-15, 18, 20, 23-26 and 28 rejected under 35 U.S.C. 102(e) as being anticipated by Ma et al (US 2005/0224764).

Ma et al teach the composition of an electroconductive ink comprising: (i). Carbon fibrils; (ii). Carbon black; (iii). A binder comprising polyurethane, polyester, polyacrylic acid, epoxy; and (iv). A solvent such as butyl carbitol (Abstract, Para 0051 0110, 0113, 0115, 0119). The prior art teaches making the ink by mixing the components. The prior art further teaches forming a field emitter by depositing the ink over an Al-foil forming a pattern of squares and curing it (Para 0178). With regard to claim-8, the prior art composition is identical to that by the applicants, and identical compositions have identical properties. With regard to method claims 18 and 23-26 and 28, the prior art teaches mixing the components that are identical to that claimed by the applicants forming an ink, and coating the ink over a conductive substrate by screen printing followed by drying/curing (Para 0178) thus forming a field emitter. With regard to claim 20, the prior art further teaches measuring the emitter properties (Para 0179). All the limitations of the instant claims are met.

The reference is anticipatory.

3. Claims 1, 3-8, and 12-15 rejected under 35 U.S.C. 102(e) as being anticipated by Arthur et al (US 6,988,925).

Arthur et al teach a patterned film formed over a substrate comprising CNT and carbon black (CB) impregnated with a photoresist and providing a binder of polyurethane between the CNT layer and an insulating layer (Abstract, C-4, Ln 59-63, C-7, Ln 18). The filling of voids between the CNT/CB with the photoresist will be anticipated due to impregnation.

With regard to claims 5-7, the prior art composition and its components are identical to that by the applicant's, and the examiner asserts that the art composition will be identical to that made using the composition having specific properties and containing the components that are not an essential part of the composition as claimed.

With regard to claim 8, prior art composition is identical to that by the applicants, and identical compositions have identical properties.

With regard to claims 12-15, the prior art teaches a patterened film over a substrate surface and the examiner asserts that the prior art composition and structure will be identical to that formed by the instant claimed process step in claim-14.

4. Claims 1, 3-8, 12-16, 18, 21-24 and 26-28 rejected under 35 U.S.C. 102(b) as being anticipated by Kishimoto et al (US 4,071,474).

Kishimoto et al teach a secondary electron emission layer comprising a dispersion of conductive agents such as carbon black in a thermoplastic resin such as polymethyl methacrylate (PMMA)(Cl-6, Ln 45-51; Cl-7, Ln 7-10, 15-18). With regard to the method claims, the prior art teaches mixing the components forming the paint and coating it over a surface (Cl-8, Ln 61-66).

With regard to claims 3 and 16, the prior art teaches PMMA <photorsist and diamond precursor> (See, Hiroka et al, Cl-1, Ln 56-67; Cl-2, Ln 31-41; and Tang et al US 20040245910,Para 0056).

With regard to claims-4 and 13-15, the prior art teaches painting a channel plate, pipe or a sponge or a flexible pipe (Cl-6, Ln 30-33; Cl-7, Ln 56-60) and the examiner asserts that the prior art composition and structure will be identical to that formed by the instant claimed process step in claim-14.

With regard to claims 5-7, the prior art composition and its components are identical to that by the applicant's, and the examiner asserts that the art composition will be identical to that made using the composition having specific properties and containing the components that are not an essential part of the composition as claimed.

With regard to claim 8, prior art composition is identical to that by the applicants, and identical compositions have identical properties.

With regard to claim 12, the prior art teaches an electron multiplier tube.

With regard to method claims 18, 21-24 and 26-28, the prior art teaches making a coating by mixing the components that are identical to that claimed by the applicant's, and coating the composition over a conductive substrate that is either porous or planar by spin/dip coating followed by drying/curing. All the limitations of the instant claims are met.

The reference is anticipatory.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1, 3-9, 12-15, 18, and 20-28 are rejected under 35 U.S.C. 103(a) as being obvious over Blanchet-Fincher et al (US 5,948,465) in view of either Ma et al (US 2005/0224764) or Tuck (WO 02/03413).

Blanchet-Fincher et al teach a composition comprising carbon soot, methanol and polyethylene oxide <a thermoplastic polymer binder> and making a field emitter by coating it over an electrically conductive surface (Col-2, Ln 32-36, col-2, Ln 65 –Col-3, Ln-3; Col-3, Ln 51-52). With regard to process steps in claim 18, the prior art teaches mixing the components that are similar to that by the applicants.

The prior art fails to teach the specific binder in the composition, and a process of using the composition.

In the analogous art, Ma et teach the composition of an electroconductive ink comprising: (i). Carbon fibrils; (ii). Carbon black; (iii). A binder comprising polyurethane, polyester, polyacrylic acid, epoxy; and (iv). A solvent such as butyl carbitol (Abstract, Para 0110, 0113, 0115, 0119) and forming field emission cathodes by depositing the ink over an Al-foil forming a pattern of squares and curing it by heat (Para 0178) (See rejection-2 under 35 USC 102(e)).

In the analogous art, Tuck et al teach the composition of filed emitters containing **methacrylate polymers** and carbon black (See rejection-1 under 35 USC 102(b)).

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute the binders of Blanchet-Fincher et al with the binders of either Ma et al or Tuck et al as functional equivalents with reasonable expectation of success, because the teachings are in the common field of field emitter containing carbon black, and the combined prior art is suggestive of the claimed composition and the process step.

With regard to claims–3 and 21, the combined prior art teaches methacrylate polymers <photoresist> (See Angelo et al, US 4,376,057; Cl-2, Ln 7-10).

With regard to claims 5-7, the prior art composition is similar to that by the applicants, and the examiner asserts that the art composition will be similar to that made using the components under specific process conditions of the applicants.

With regard to claim 8, prior art composition is similar to that by the applicants, and similar compositions are expected to possess similar properties.

With regard to claim 9, the prior art teaches carbon soot that is similar to the soot from diesel/fuel-oil/hydrocarbon source.

With regard to claims 12-15, the prior art teaches a field emitter cathode over a conductive substrate that is planar, fiber, a wire or a SS flex screen, wherein the components are similar to that by the applicants, and the examiner asserts that the prior art composition and structure will be similar to that formed by the instant claimed process step in claim-14.

With regard to claims–17 and 19, the combined prior art sol-gel silica binder.

With regard to process steps 20 and 22-28, the prior art teaches mixing the components, coating a conductive substrate including planar, wire and flexible stainless steel screen, and drying the coated film forming the filed emitter wherein the art components and the process steps are similar to that by the applicants (Col-2, Ln 13-31; Col-3, Ln 53-Col-4, Ln 9; Col-5, Ln 36-40; Col-6, Ln 37-40; Col-7, Example-1). The prior art further teaches measuring the emission current as a function of applied voltage (Col-6, Ln 48-57).

2. Claims 9 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tuck (WO 02/03413) in view of Blanchet-Fincher et al (US 5,948,465).

The disclosure on the composition of filed emitter by Tuck et al as set forth in rejection-1 under 35 USC 102(b) is herein incorporated.

Tuck fails to teach the use of carbon soot in the composition per claim-9 or measuring the field emitter properties per claim-20.

In the analogous art, Blanchet-Fincher et al teach carbon emitters comprising powders of graphite, micronized coke, polycrystalline diamond and carbon soot dispersed in a binder (Col-2, Ln 32-36) and measuring the filed emitter properties as a function of applied voltage (Col-6, Ln 38-47).

It would be obvious to a person of ordinary skill in the art to combine the prior art teachings to substitute the carbon black of Tucker et al with carbon soot of Blanchet-Fincher et al as functional equivalent with reasonable expectation of success, because the teachings are in the analogous art of field emitters and the combined prior art is suggestive of the claimed composition.

It would be obvious to a person of ordinary skill in the art to measure the properties of the filed emitter as a routine quality control function of the process control to optimize the process steps as shown by the measurements by Fincher et al with reasonable expectation of success.

3. Claim 36 rejected under 35 U.S.C. 103(a) as being unpatentable over either Tuck (WO 02/03413) or Ma et al (US 2005/0224764) in view of Hattori et al (US 5,599,749).

The disclosure on the composition and method of making the field emitter by Tuck et al and Ma et al as set forth in rejection-1 under 35 USC 102(b) and rejection-2 under 35 USC 102(e) respectively are herein incorporated.

The prior art/s fail to teach a step of planarizing the active cured layer containing the composition.

In the analogous art Hattori et al teach planarizing cured active layer of a field emitter containing DLC by CMP and its benefits with improved adhesion bonding and mechanical strength of the electron emitting layer (Cl-14, Ln 60; Cl-15,Ln-4-15).

It would be obvious to a person of ordinary skilled in the art to planarize the active layer by CMP as a choice of design of the finishing step in the process of making the field emitter to benefit from improved mechanical strength of the electron emitting layer with reasonable expectation of success, because the combined prior at teaching is suggestive of the claimed process step.

***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kallambella Vijayakumar whose telephone number is 571-272-1324. The examiner can normally be reached on 8.30-6.00 Mon-Thu, 8.30-5.00 Alt Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KMV
October 05, 2006.

DOUGLAS MCGINTY
SUPERVISORY PATENT EXAMINER

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